Canterbury

"CANTERBURY IN ASHBURTON"

James A. Lee

LANE WALKER RUDKIN LTD. ASHBURTON

THE ASHBURTON MILL

Man is the shuttle, to whose winding quest

And passage through these looms

God ordered motion, but ordained no rest.

Henry Vaughan, 1622-1695.

"THE TURKISH WEAVER"

Author's Notes

In compiling this book an attempt was made to reduce the description of complicated processes to simple terms, but it was quickly realised that in this direction one could go so far but no further, otherwise the function of a machine and the purpose of an operation would become obscured.

Whilst considering the many young people who visit us, but having regard for the large number of adults who inspect this factory, descriptive simplicity has not always been strictly adhered to, because usually our young visitors are accompanied by grown ups, who will gladly impart to them an understanding of the more involved passages in this book. In any case your guide will be pleased to enlarge on any further part of the manufacturing process, if you ask him to do so.

Historic notes and odd facts are introduced to provide added interest.

The Textile Trade is proud of its history, which is very considerable indeed. In the few notes given, conjecture has been carefully avoided, though where several historic versions exist the most feasible has been chosen.

This book comes to you through the courtesy of the Directors of Lane, Walker, Rudkin Limited, without whose sanction it would not have been possible.

Their wish is that it will add to the enjoyment of your visit, and enliven interest in the modern practise of an ancient craft.

James A. Lee

Foreword

Noise, in almost any industry interferes with a verbal explanation of the function of a machine or the purpose of a process. This booklet has been compiled to give you a better understanding of the many fascinating things which are to be seen in our Mill.

Your Guide will indicate by means of numbers, the various stages of manufacture as you reach them. When a number is indicated, turn to the appropriate section in your booklet and read it, then proceed to inspect the machine or process referred to.

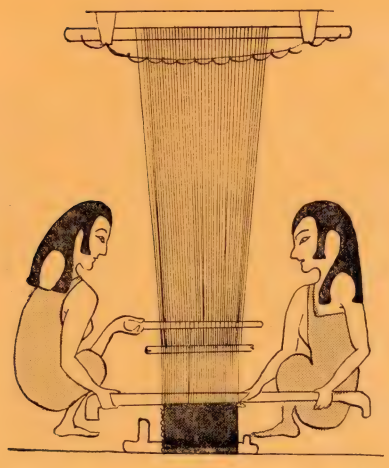
Wonderful Wool

Wool is the ideal fibre for the manufacture of clothing materials. Wool is a protein fibre and therefore stores warmth, it is porous — it breathes, it is absorbent and can take up to 30% of its own weight in moisture without becoming damp. Wool has natural felting properties due to its serrations and microscopic scales. The fibre as it would appear if viewed under a powerful microscope, is illustrated in Figure 1.

FIG. 1

You will notice that the fine wool has more "scales" than the medium quality fibre, which in turn has more scales than the coarse or crossbred wool, whilst on the hair, scales are practically non existent. These scales help the wool to "felt," and they also break up the fibre's tendency to reflect light. That is why fine wools are dull, and coarser wools become increasingly lustrous as they approach the structure of hair, which is, as you know, positively glossy.

SPINNING, ANCIENT EGYPT.



PAINTING FROM A TOMB, THEBES, 1200 B.C.

ANCIENT GREEK VASE, 6TH CENTURY B.C. WOMEN CAN BE SEEN WEAVING AND SPINNING.

Historic Wool

As a protection against the elements, wool succeeded the skin coverings of Cavemen, just as the hut replaced his rock dwelling.

Although the origin of woollen manufacture is lost in the mists of history, few crafts have survived the passage of centuries with so many processes more or less unchanged in principle.

In this Mill you will see practices known to the craftsmen of ancient Egypt, and actions that were old in India before Buddha was born.

No single source of development in these crafts can be traced, indeed, Pizarro when in Mexico in 1529, was astonished to find the art of spinning and weaving developed to such a state of perfection, that cloths of exceeding fineness were made there.

Where modern machines help us, dexterity and skill are still required, though we marvel at those Ancients whose primitive tools required delicacy of manipulation which sprung from generations of habit and practise.

Here We Begin

Our journey starts in the Wool Store where hundreds of bales are stacked. This represents the supply bought in auction, and held to meet the demands of the yarns and fabrics to be produced during the following year.

Filled wool packs became a feature of the British Parliament during the 13th century. They were placed there to remind Peers of the importance of Britain's wool trade. Originally all King's Councillors sat on these packs. Nowadays one symbolic seat is reserved for the Lord Chancellor.

Most of the wool we use is from the Merino sheep. This is the finest of all wools and is used in the manufacture of soft and superfine fabrics, such as underwear, worsted suitings, skirtings and sports cloths.

This wool is grown principally in Australia, though New Zealand's crop is not inconsiderable, and its quality is excellent. It comes mainly from the MacKenzie country and districts stretching to the south of Lindis Pass.

New Zealand Crossbred wools are, of course, world famous and this type is in demand for the manufacture of fabrics which require its more rugged characteristics.

The Merino Sheep was introduced into Australia by Captain McArthur in the year 1792, and it flourished in this New Land.

Commonly supposed to be of Spanish origin, the breed was actually developed in North Africa's Atlas Mountains at a time when the Roman Empire was still a force in Europe. Flocks were tended by the Arab tribe of Ben Merin, hence the name given by Spanish traders to this extremely fine wool.

Captain Cook was the first man to bring sheep to New Zealand. He transported two Merinos from Cape Colony and liberated them on the Marlborough coast.

Wool Sorting

Wool, bought in Auction has been "classed," which means that it has been graded into main catagories of quality.

The Wool Buyer inspects this wool in a store before it is auctioned and carefully notes the characteristics such as length, strength, fineness, and yield, (quantity of clean wool expected after the grease and dirt are removed in scouring). The amount of seed and vegetable matter present, and the general condition of the wool is considered. An estimate is then made of the different types which may be sorted from the bulk classing.

On all these points the Buyer bases his estimation of value, he goes into auction armed with this knowledge, and bids accordingly.

It is the Sorters' task to subdivide the bale of wool into precise qualities and types. In the fleece of one sheep there are several grades of wool, apart from difference in fibre, length and colour.

Years of experience teach the Wool Sorter to quickly recognise the characteristics of each type of wool — his busy fingers separate them and baskets await the wools thus selected. As the baskets become filled their contents are tipped into waiting bins so that the physical properties of any particular type can be used to advantage later.

Wool Scouring

2 Wool sorted in this fashion is taken from the bins and scoured. The machinery which removes the dirt and the natural grease from wool, consists of a chain of scouring machines or "bowls" working as a set. The first bowl contains the strongest scouring liquor and succeeding bowls become progressively cooler and their cleansing agents are not so highly concentrated.

At the commencement of operations, greasy wool is fed into the first bowl at a rate which is determined by its quality and type.

As wool qualities become finer so does the natural grease content increase. In fine wools up to 50% of the weight scoured is lost. This represents mainly the weight of natural grease it contains, and to a lesser extent dirt.

3 A long harrow immerses the wool and conveys it slowly through the liquor towards the end of the bowl.

4 Here wool emerges and passes through rollers which squeeze out surplus liquor. The wool prceeds and drops into another bowl and the operation is then repeated. Observe how the wool is becoming cleaner and whiter as it travels down the set of machines.

5 The last bowl contains warm water only, which constantly circulates and rinses the wool, for it is important that any residual grease or scouring agents are removed because these would have a detrimental effect on the wool during later processes.

Wool Drying

6 After scouring (and dyeing) wet wool is despatched to the Wool Dryer, where it falls onto a moving lattice which conveys it through a series of four drying chambers.

Heated air currents, guided by the carefully designed interior shape of this machine, and controlled by powerful fans, penetrate the wet fibres, thoroughly drying them. The wool comes out of the machine cool, clean and dry.

7 On emerging from this machine it is conveyed to a wool packing mechanism, and here, as it were, are the cross roads of processes, where it takes the particular path on which its quality and characteristics will be fully utilised.

FLEMISH MINIATURE OF DYERS AT WORK, FROM BARTHOLOMAEUS ANGLICUS VERSION OF "DE PROPRIETATIBUS RERUM" (1482).

Reproduced by courtesy of the British Museum, London, and with the help of Ciba Ltd., Basle.

Wool Dyeing

Wool dyes come principally from the United Kingdom, Switzerland and Germany. All products are catalogued by the Dye manufacturers,
8 and their properties listed. These lists are carefully considered by the Dyer when selecting a dye or combination of dyes to give a required shade. Only high quality dyes are used, that is, those which will not fade in sunlight or lose colour when the garment is washed. **All conditions to which the finished article will be subjected are considered, so that the wearer's satisfaction is ensured.**

The first dyeing vessel we inspect is used for dyeing " loose " wool, that is, the form in which it emerges from either the wool dryer or from the last scouring bowl.

There are two machines, one holding three hundred pounds of wool, and a larger vessel which has a capacity of six hudred pounds. The machines are constructed in stainless steel throughout — as are all dyeing vessels in this department.

The dyeing procedure is briefly this. A dyer, having selected his dyes, weighs out the amount he will need to give a certain colour of a certain depth to a particular weight of wool. These dyes are in powder form and when weighed are placed in a container, hot water is added and the mixture thoroughly stirred until the dyeware is dissolved.

Many famous men have by their industry and endeavour made magnificent contributions to the excellence of modern dyes.

Space does not permit the listing of this illustrious company, and it would be an injustice to great men were the list to be condensed.

Mention must be made, however, of one whose name lives in a most unique way.

Many years ago, in Paris, there dwelt a dyer who toiled at his trade in a small room of a small house in a small street. There he spent his lifetime, and as a result of years of industry, the street came to be called after him, and its original name was lost forever.

Later, at a time when the dyer had been dead and forgotten for many, many years, a Music Hall was built on the same street, taking its name from it.

The dyer? Monsieur Bergere; the Music Hall?

FOLIES BERGERE!

The resultnat liquor is put into a tank which is connected to
12 the main vessel of the dyeing machine — the latter having been filled with wool which is to be dyed. Sufficient water to saturate the wool is added
13 to the dyeware — and it is then introduced to the main vessel by means of a powerful pump.

Flow of liquor is kept circulating, first in one direction and then in an opposite direction to make certain that the penetration is complete.

Acids (usually sulphuric, acetic, or formic) are added to the liquor, for these, in conjunction with a high liquor temperature, help the wool to assimilate the dye.

Temperature is slowly raised until boiling point is reached, and it is then kept boiling for approximately one hour. As the dyeing continues, this liquor, which at the start of operations was thickly coloured, gradually becomes clear, until towards the end of the process, no colour remains in it, every particle of dye having been taken up by the wool. The dyer then knows that a correct result has been reached (if dye is still present in the liquor he would add acid to further aid " exhaustion " otherwise the ultimate shade would be lighter than that required) gradual cooling follows, then the wool is removed from the vessel and dried.

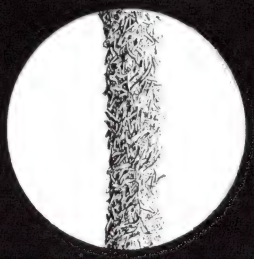
The next machine to be seen is a wool " top " dyeing vessel. A
14 top is a ball of combed wool, the production of which will be seen elsewhere. In principle this machine is similar to the wool dyeing vessel, having a mixing tank above, and a circulating pump at the rear.

Within the main tank are to be seen numerous cylindrical contain-
15 ers, which are set in uniform rows. In these containers wool tops are placed so that their form will remain undisturbed by the dyeing process. Dyeing procedure, as previously described, is followed.

PIECE DYEING

In the woollen trade a length of woven fabric (usually about sixty yards long) is known as a " piece." In this form woven fabrics are sometimes dyed.

The piece dyeing vessel is built to contain a length of material sewn
16 end to end so that it runs in continuous rope form. A revolving winch keeps it in motion, because continuous movement aids a gradual penetration and level assimilation of dye.



WOOLLEN

WORSTED

WOOL SORTING

SCOURING & DRYING

White Yarn

DYEING

BLENDING

CARDING

SPINNING

CARDING

COMBING

DYEING

White Yarn

RECOMBING

DRAWING

SPINNING

TWISTING

WARPING & WINDING

WEAVING

MENDING

WET FINISHING

DRY FINISHING

Yarn Production

Two types of yarn are produced from wool. One is known as a "Woollen" yarn, the other is called "Worsted". These yarns greatly magnified are seen in figure 2, the difference in their structure is readily recognised.

The woollen yarn is composed of fibres adhering to each other in a tangled form. Short fibres play a part in the construction of such a thread.

The term "Worsted" is derived from the name of a small English Village called Worstead, where, in Elizabethan England, these yarns were produced.

Worsted yarn is spun from fleece wools, the short fibres having been removed first in the sorting process and later (to a more considerable extent) by a combing machine.

The yarn or thread is smooth in structure, all fibres having been laid parallel, though twist is inserted to give it strength.

Thread can be spun to a much finer diameter on the Worsted system, than those which are possible on the Woollen system.

FIG. 2

" The Romans had two main types of cloth, one of them, " densa," bore a close resemblance to our Woollen cloth, being felted and having a napped face, whilst the other, called " trita " was threadbare similar to modern Worsteds.

Generally speaking, worsted yarns are used in fine suitings, skirtings, gabardines, sports trousering, fine underwear and hose. Woollen yarn goes into the production of blankets, rugs, coatings, tweeds, sportscloths and flannels.

Woollen Yarn

17 Proceeding to the " Woollen " section, the first operation to be inspected is that of Willowing and Blending.

As a result of the wet processes (such as scouring and dyeing), wool becomes somewhat felted, and so must be disentangled, rendered free, open, and in a state suitable for the subsequent carding operation. This is done on a " Willow " Machine, which is a large mechanism bristling with
18 spikes. These are set in the main cylinder as well as in the numerous attendant rollers. Their function is to open matted wool as it passes through the machine, and, just as one would put the coarse half of an ordinary hair comb through unruly locks before using the fine teeth, so do these coarse spikes precede the finer action of the carding machine.

On entering the "Willow", the wool receives a light sprinkling of an
19 emulsion, which allays the static electricity charge created by the friction of wool fibres going through machines. You know how dry hair crackles when combed vigorously, that too, is static electricity.

Wool mixing is done by a series of fans, pneumatic conveying tubes,
20 and bins which are linked to the delivery end of the Willow. This network is specially designed to ensure uniformity of mixing, which is very important especially where component colours are required in a blend.

After due treatment here, wool is then blown through conveyer tubes to the next department.

Woollen Carding

21 Six huge machines comprise the Woollen Carding section of the Mill. These are Carding Engines and their function is to "fine comb" and "brush" wool fibres after the disentangling action of the Willow.

22 Behind each machine is a huge bin which receives wool blown from the Blending Room.

23 Then the wool is taken from these bins and placed in a Hopper which measures it into the card.

24 A spiked lattice lifts the wool from the hopper and drops it into the pan of a weighing mechanism. When a predetermined amount of wool has been weighed, the pan tips and deposits its contents onto a lattice which is moving the uniform layer of wool into the Carding machine. The rate at which wool is fed into the machine is dependent on the diameter of of the yarn required.

So begins a long journey. A carding machine consists of a series of rollers and cylinders of varying sizes. They are covered in a brush-like fashion, with wire taking the place of bristle. The function of these rollers and cylinders is to progressively brush the wool whilst conveying it through the machine.

25 Notice how the wool is more perfectly blended as it moves along until the half way point is reached. There is then a break in the series of rollers, and wool is taken from the last cylinder of the first half, on to the second part, the fibres being laid in the opposite direction to that which they have travelled thus far. This helps towards a more perfect uniformity of blending.

Reduced to figures, the "long journey" through one Card means, that wool will be directly processed by an average of some 80 rollers, whose totalled revolutions reach 12,000 per minute having an aggregate surface length of five miles!

26 Carding operations continue until the end of the machine, known as a "Condenser," is reached. This mechanism turns the film of carded wool into a "foundation" of a thread.

27 Observe how the film of wool passes into the "nip" of two rollers. Driven by these rollers continuous leather tapes rotate — 96 in all. The tapes are acually splitting (or cutting) the film of wool into 96 strips, and the tapes convey these strips to four sets of rubbing rollers.

28 If you look carefully at a tape you will see a film of wool adhering to it.

29 This film is taken from the tape by the pair of leather aprons which perform a rubbing action. Like tobacco in the hands of a man rolling
30 a cigarette, it is rubbed and tangled into cylindrical form. This is the foundation of the thread, which can be seen emerging from the rubbers as it is wound onto a spool. These spools, four in number, each containing
31 24 embryo threads, are now taken to the spinning machines.

Woollen Spinning

The machine on which yarn is spun is known as a "Mule". It was invented by Crompton between the years 1764 and 1769.

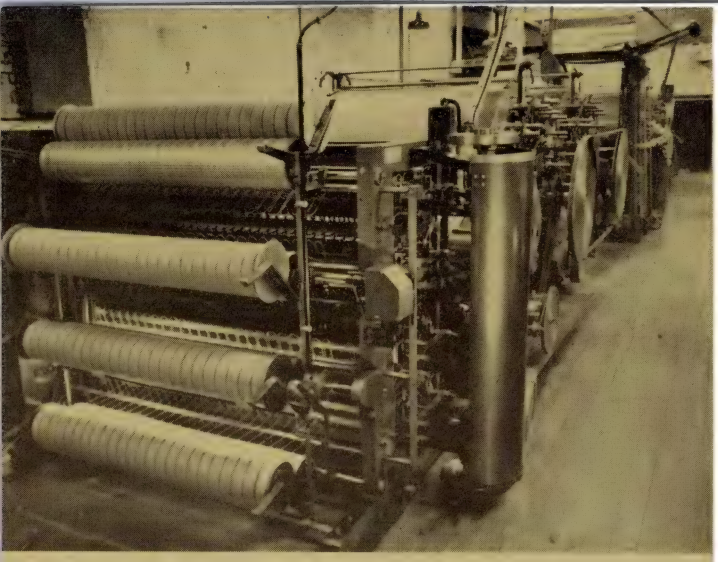
Its motion today is the same as that originally conceived by the inventor, apart from one or two small though important additions.

The principal of Mule spinning and the action of the machine resembles that of a hand spinner, in fact Crompton just about reproduced a woman's actions at her hand wheel, save that the single thread she spun was multiplied by a score or more. Today many hundreds of threads are spun simultaneously.

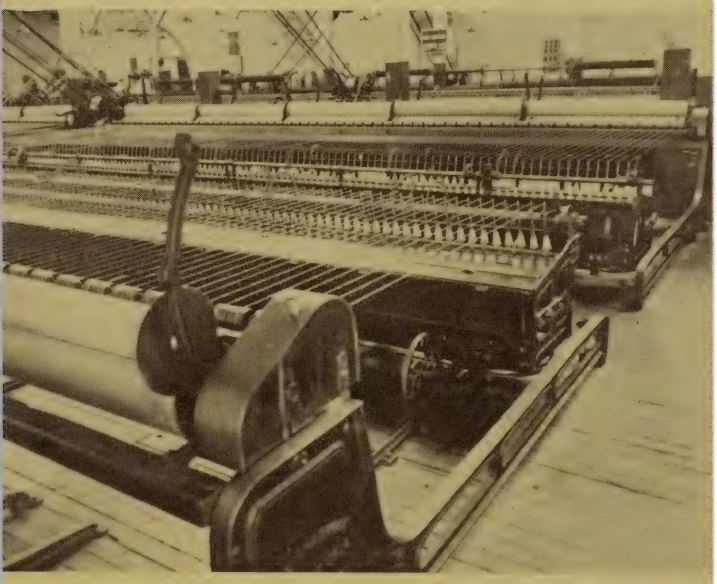
The origin of this curious name "Mule" is obscure, though it was the custom of inventors at that time to name their machines and devices, hence Stephenson's "Rocket."

Hargreaves, a contemporary of Crompton, invented the forerunner of the spinning "frame" which he called "Jenny" after his wife.

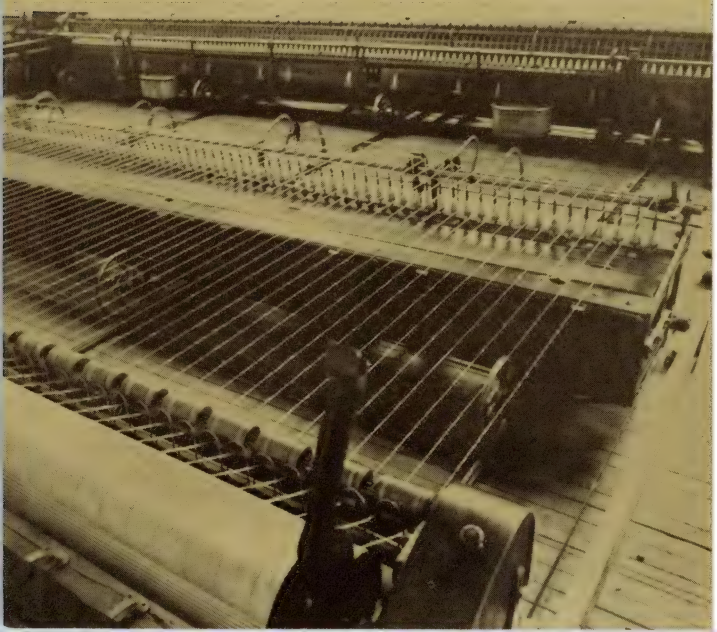
Historians make a point of noting that Crompton was also a married man!



WOOLLEN CARDING



SPINNING "MULES"



SPINNING WOOLLEN YARN

To appreciate this principle we must first study the cycle of operations.

The action of spinning is this. First of all the spool from the Card-
32 ing machine is placed on rollers at the back of the mule.

Each individual "foundation of thread" (rolled cigarette) is
33 attached to a spindle mounted on a carriage, which moves outward and inward. The sequence of action commences at a point nearest the card spool.

On its outward journey, the carriage draws out all the ends, mean-
34 while the spools are revolving, so giving off a certain length of "thread foundation."

When this length has been
35 reached, the spool ceases to pay out, but the carriage continues to
36 move thus drawing out the intervening length of "foundation" to a finer diameter. When this diameter is obtained, the spindles revolve at high speed inserting twist (for strength) into the intervening length, which is then spun yarn.

In only one minute the length of yarn spun by all spindles in this room totals nine miles, but this very often (due to fineness of thread) represents only three or four pounds of wool.

When the necessary twist has been imparted to the yarn, it is wound
37 onto the spindle as the carriage again approaches the spool, and then recommences the cycle.

Watch this action several times and you will very easily imagine a woman operating her spinning wheel, the spool of carded wool being in her left hand. With her right hand she draws it out to the required fineness. When this is reached she spins her wheel and rotates a spindle thereby putting twist into the thread. As spun yarn it is then wound onto a bobbin.

Worsted Yarn Production

There is a noticeable similarity between early operations in the Worsted and Woollen processes.

38 Again we have the "Willow" or opening machine, but there are no mixing bins for we deal here with white wools only (dyeing occurs at a later stage). The same application of anti-static emulsion takes place, also pneumatic conveyance of wool to the Carding Department.

WORSTED CARDING :

There are one or two important differences between Worsted and Woollen carding machines, though in principle they are substantially the same.

39 Wool is again fed into a hopper and so conveyed to a scale pan, which weighs out in a manner which ensures a constant and uniform flow to the machine. Once again the wool starts its journey through the wire " brush " covered rollers and cylinders.

40 As we move down this machine the first major difference can be seen — there is no half way break in the carding operation, the wool fibres move straight through the machine. *Remember that long parallel fibres are the characteristic of a worsted thread.*

41 The second difference is now apparent. There is no condensor — no rubbing motion, instead, the film of carded wool comes out as a huge fleecy ball.

Now commences a maze of process and reprocess. Often the action of one machine is repeated in every detail by a succeeding machine, but the sole aim is to gradually and carefully straighten the fibres and to keep them straight, to gradually and carefully blend them, and to gradually and carefully draw them finer until a final diameter of thread is reached. Bear in mind the fact, that the final diameter is now playing a part in the adjustment and speed of this machine, and every other machine in the department.

42 An early example of this careful repetition can be seen at the two machines which follow the carding operation. These are called gill boxes.

43 Carded wool in ball form is placed behind the first machine. The balls flow in side by side, entering what is termed the "drafting area" (drafting means pulling out) then steel pinned fallers, like combs, pierce the wool. These fallers exert a combing action on the material. The whole operation is aimed towards keeping wool fibres parallel, at the same time drawing out the volume of wool entering the machine.

44 You will see this action which is known as "Gilling" repeated many times.

45 Notice how several balls of wool merge on entering the machine, to emerge in a single ball. Resultant balls are then grouped behind the second gill box, the action described is repeated, resulting again in one ball of wool. Therefore, if six balls are fed into the first machine and four into the second machine, the resultant single ball of wool is drawn from twenty-four balls of carded wool. This is known as "doubling".

It has been demonstrated how "doubling" to the power of 24 is accomplished on two machines. This action continues to such an extent, that as many as 216,710,774,784,000 doublings can occur during the course of a yarn's production.

The next machine to be inspected is a "Backwashing Machine".
46 Here wool "tops" are placed after the dyeing operation. On entering this machine they are rinsed by immersion in a series of three bowls, following which they are passed through a drying chamber. On leaving this chamber wool is "gilled" and made up into ball form. If a yarn of mixed colours is to be produced, for example, an Airforce Blue type, the component colours of the mixture are marshalled together to enter the machine in something like the following order.

2 Tops of Dark Slate.

3 Tops of Dark Blue.

2 Tops of Dark Silver Grey.

1 Top of Dark Bottle Green.

The immediate result would be a rude form of colour blending, but as doubling and drawing continue, all components merge into the desired misty effect of a well planned "mixture" (of colours).

47 Wool passes once more through a gilling process, and is then made into a form suitable for the important combing operation.

"Backwashing" is only one of many curious terms encountered in the Textile Trade. The origin of such names can be traced to the days of the Handcraftsmen, when a process or operation would be covered by a descriptive title. This title more often than not was contracted in form, for convenience, perhaps in slang fashion, and the resultant term was given to the machine or mechanism, which superseded the hand operation after the Industrial Revolution.

A good example can be found in the Weaving Room, where a loom mechanism is known as the "little lad stick." This stick, part of the shuttle propelling motion — discharges an action which in byegone days was performed by the hand weaver's "little lad" — his son, or his apprentice.

DRY CHLORINATION :

We trust our male visitor is familiar with Canterbury's "NO MEND"
48 shrink controlled socks. If you are a housewife and your husband does not wear them, we must conclude that you are fond of darning and prepared to go to painstaking lengths, to avoid felting or shrinking of socks during a normal washing prccedure.

Our dry chlorination plant solves the shrinkage problem, for here, through a carefully controlled process, wool is made proof against shrinkage, and, what is more important, the fibre is undamaged, and its "handle" unaffected.

There are more brutal methods, there are quicker methods, and also there are cheaper methods, but our concern is a satisfied customer, so we don't mind a little extra care and effort.

This is what happens : Wool tops are dried to a regain of 7% moisture (which is just half the normal moisture content of wool and is very, very dry) they are cooled and placed in the auto-clave, which is an air tight container. Air is extracted from this container and Chlorine gas introduced with extreme care in a manner which ensures perfect penetration. The gas is then pumped away and rendered harmless. The wool is afterwards neutralised, gently scoured and then redryed, and, complete with original bloom, warmth, and handle, it goes forward with one added (and most important) quality — it is shrink controlled!

Strength and increased wearing properties are obtained by blending in just the right amount of first grade nylon fibre. Nylon is junior partner to wool but it is a very important and sustaining helpmate.

The Nylon and Wool blending is to be seen in the Combing Section.

NOBLE COMBING MACHINE

Wool Combing

The term combing has been used in describing some of the machines just inspected, but it has been used in a general sense, as the real combing operation takes place on a machine known as the Noble Comb.

This is a vital stage of operations, because not only is the operation more exacting — comb pins being more numerous than anything hitherto encountered — but shorter wool fibres are combed from the long fibres, leaving only perfectly straightened wool fibres to continue through the processes that lie ahead.

52 The comb carriage on which a large circular comb is mounted, slowly revolves.

53 Within the large circle two smaller circles also revolve.

54 They are so situated to allow large and small circles to run together at a particular point, and at this point the wool is dabbed (pressed) onto the pins of both circles by a fast moving "Dabbing" brush.

55 The circles part, each carrying wool firmly embedded in their pins.

56 The wool protrudes from the circles in the form of a fringe, 57 which is later drawn off by rollers placed close to both large and small circles. The rollers pull all long fibres through the pins of their respective circles, thus combing them. The two streams of combed wool then merge, and are drawn 58 from the centre of the machine in rope form to be conveyed to a waiting container.

Wool Combing is a craft which enjoys saintly patronage.

Saint Blaize, who was Bishop of Sebaste, Armenia, during the second century, is Patron Saint of Wool Combers.

During religious persecution of the early Christian Church, he sought sanctuary in a cave on Mount Argeous, where he spent his time praying and fasting. He had a deep love and understanding of animals, even the most ferocious types would approach his cave and lie down quietly and in harmony in the presence of the Saint.

Bishop Blaize was eventually captured by hunters who handed him to the pagan Governnor of Cappadocia, who had him put to death. The instruments used for his torture and death were rude iron wool combs then in use.

Great processions were held in the wool centres of England to mark the Saint's feast day which falls on February 3rd, the last great one taking place in Bradford in 1825. The Craftsmens' Guilds which sponsored such processions were fast disappearing in the upheaval of the Industrial Revolution.

59 Returning to the point where wool is dabbed onto the pins of both circles when these run together, it will be noticed that the small circle receives a portion of the fringe of wool fibres overhanging the inner edge of the larger circle.

When the two circles part, the smaller takes all short fibres from this fringe (because they come away easily) long ones remaining firmly embedded (by reason of their length) in the pins of the large circle. Some long fibres are also taken by the small circle, but, these overhang and are in turn drawn off from the small circle by means of calender rollers, in the manner previously described. Only short fibres are now left on the small circle, and these pass beneath a suction device which removes them from the small circle and from the machine.

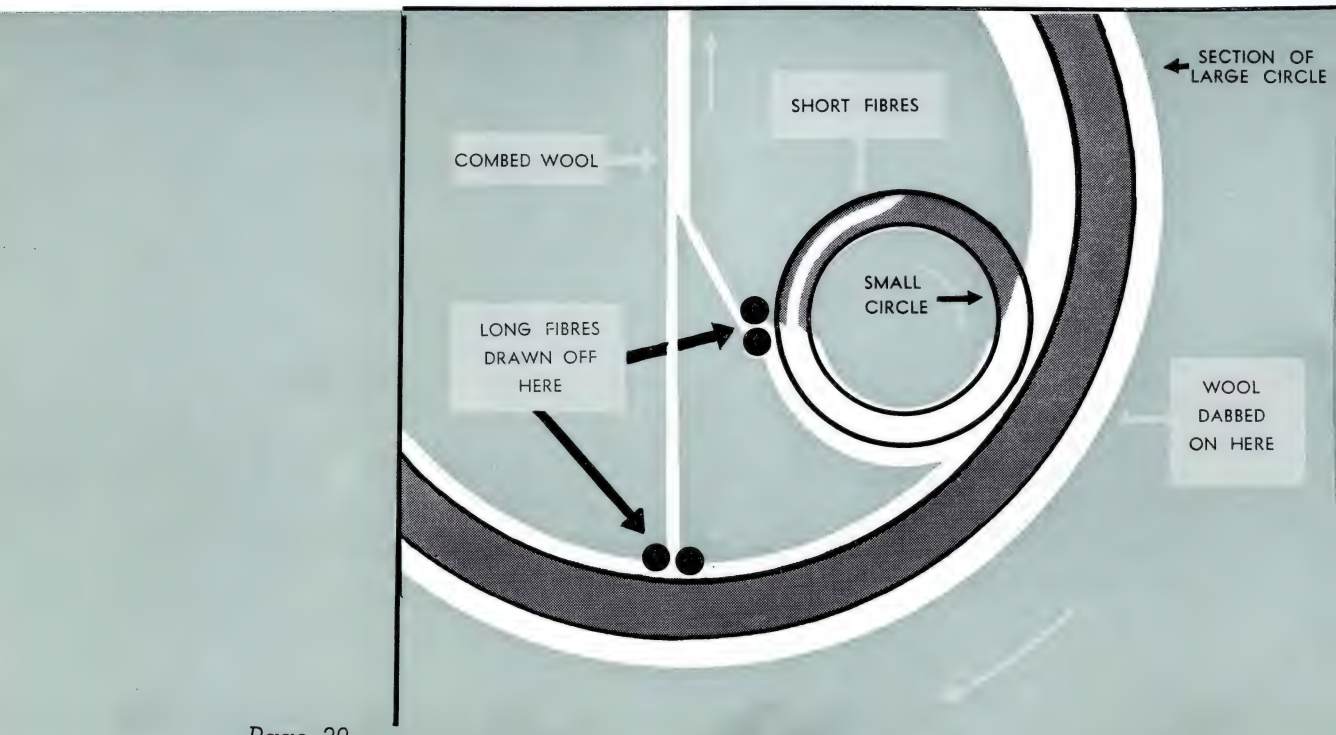
Christopher Columbus was a wool comber. His father plied this trade in the city of Genoa and Christopher helped him — perhaps the tedium of his task caused him to cast speculative eyes seaward.

60

The Combing process is followed by two Gilling operations, at the end of which we have the finished "top".

61

(This is the stage where the top goes back to the Dyeing Department if it is required in coloured form, and, after dyeing, is again processed on all machines from Backwashing to " re-combed" top stage.)

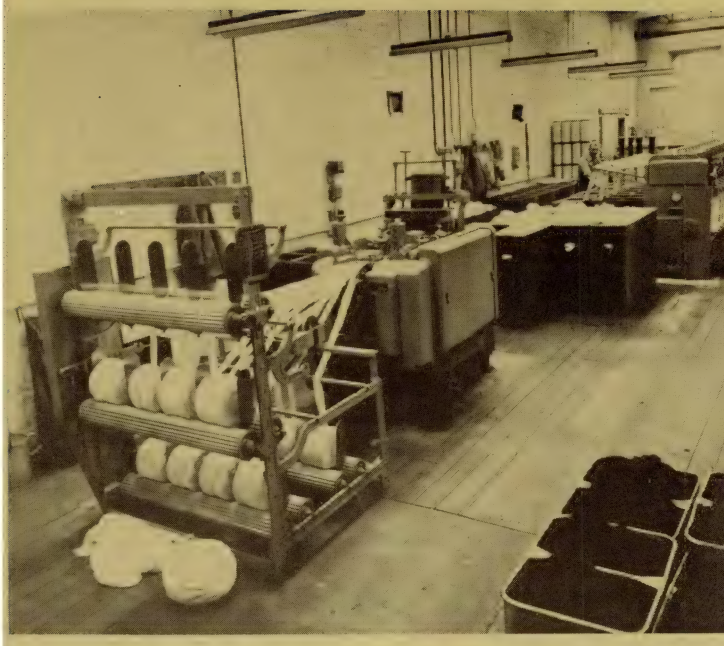


Drawing

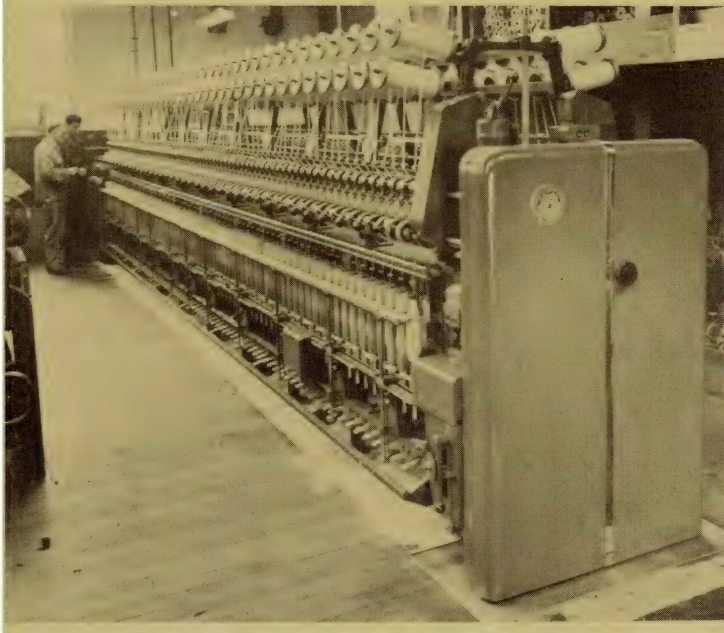
The operation of drawing was until very recently a very complicated business of "doubling" and drawing out on a battery of seven machines. Modern invention has made it possible to perform a complete and more efficient drawing operation on only two machines.

The repeated doubling, for reasons already explained to you, has been correspondingly curtailed, that is because these two machines measure the in-going wool and "draw" at a rate which alters with the varying uniformity of the in-going wool. In other words, if the wool is to be drawn out at a standard rate of five inches out-going to one inch in-going, a thick part measured on the in-going sliver would be drafted at the rate of six inches out-going, whereas a thin part measured would be drafted at the rate of only four inches out-going, so as to restore uniformity of sliver.

In simple language a thick part is pulled more fiercely, and a thin part more gently, than the standard force of "pull" (rate of draw).



AUTOLEVELLER DRAWING



SUPERDRAFT SPINNING

Auto Levelling

62 The first machine is the Raper Autoleveller Gill Box — a precision
63 machine with ingenious measuring rollers, an indicator shewing the variation in uniformity of sliver, which, when variation does occur, activates
64 a change speed device, and this in turn alters the rate of draw described earlier.

65 The next machine is the Raper Autoleveller Draw Box and it works on exactly the same principle, — indicators, change speed devices, and resultant variation of draft correcting the variation of in-going sliver weight.

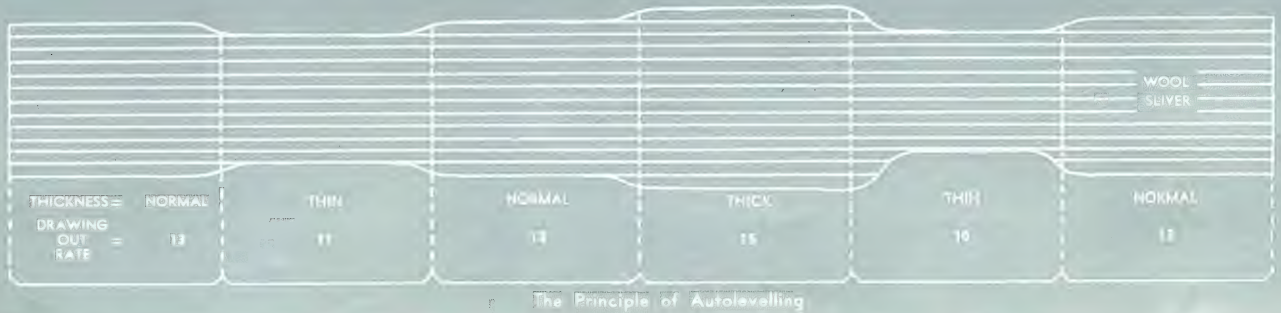
66 The new feature in this operation is the roller drafting principle, where drawing is performed by two sets of rollers, the second pair working
67 at a higher speed than the first pair and so drawing out the wool which lies between the two pairs of rollers. It may be asked " why, if levelling has been carried out on the first machine, is it necessary to have a second levelling operation?" Think of levelling as an operation similar to the smoothing of wood, the first stage being the application of coarse sandpaper to its surface before applying finer sandpaper. Our Autoleveller Gill Box can be likened to coarse sandpaper, and the Draw Box to the smooth sandpaper. They are complimentary operations.

In the year 1730 John Wyatt of Lichfield, hit upon the idea of drafting by means of rollers. He made a model machine and successfully spun thread in the year 1733.

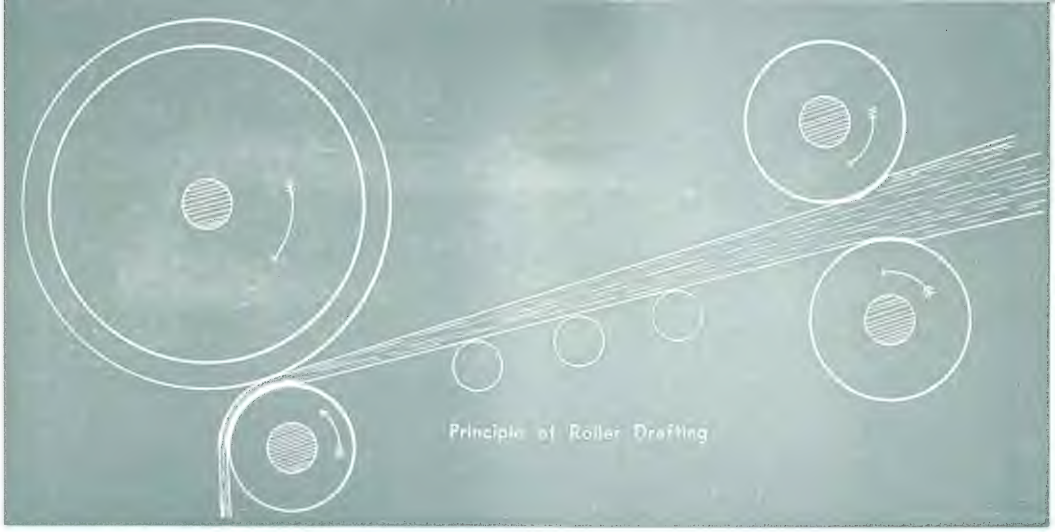
Wyatt did not have money to exploit his discovery, and was imposed on by one Louis Paul, "a foreigner," who obtained a patent for the invention in his own name.

A small spinning factory was opened in Birmingham by Wyatt and Paul, but it was a financial failure. The inventor, defrauded by Paul, was imprisoned for debt and died in comparative poverty.

68 Two further operations are necessary before the spinning stage is reached. The first is known as "Reducing", another roller drafting operation, which also takes place on the second machine which
69 is called a "Rover".



The Principle of Autolevelling



SPINNING

70 The Worsted spinning frame embodies the roller drafting principle, and for the last time wool is drawn out — the final diameter of thread having now been achieved. The reduction of Roving thickness to incredibly
71 fine thread can be clearly seen. Now that the final diameter has been reached, twist is inserted by means of a highly revolving spindle, in order to give reasonable strength to the thread.

72 Observe how the fine thread whirls around in the form of a "balloon" — impelled by a spindle speed of six thousand revolutions per minute.

The latest development in Worsted Spinning is to be seen in the
73 " Megaflex " frame. Fitted with the Ambler Super drafting device, extraordinarily high drafting is possible. This offers several technical advantages. Drafts of more than sixty are possible, whilst other types of spinning frames (embodying roller drafting) cannot go beyond a limit of six or seven.

TWISTING

74 In order to give additional strength to certain yarns (usually those used in suitings, cardigans, and half hose) they are spun to a diameter twice as fine as that required, and two threads are later twisted together. The resultant thread is termed a "two-ply" yarn.

" Ply " derives from the Latin " plicare " meaning to fold or to twist, thus " two-ply " yarns are made by the twisting together of two threads. Three-ply and four-ply are made by twisting three and four threads respectively.

WINDING

75 It is impractical to send yarn to the next process on the small wooden bobbins of spinning or twisting frames, it is therefore rewound into a cone shaped form which provides an extremely long continuous length of thread for succeeding machines.

Preparation for Weaving

Woven fabric consists of two series of threads, which interlace with each other.

One series is known as "Warp" — a term given to threads which run lengthways through the fabric.

The other series is call "Weft" and these are the threads which run across the woven fabric.

The derivation of certain textile terms throws some light on what might otherwise be regarded as curious jargon. A few examples are given below.

WARP — from the Saxon WEORPAN meaning "To throw."

WEFT — from the Saxon WEFAN meaning "To weave."

BEAM — possibly from the Greek PHUEIN which means to bring forth (could mean a "tree," see illustration "Turkish Weaver" where the beam is shown on top of the weaving frame).

HEDDLE — from the Saxon HEFELDIAN meaning "to fix, hold or anchor."

REED — So called because it was in ancient times made of reeds which were split and formed into a comb. To this day the space between the comb like teeth is known as a "split."

DOBBY — Some connection with Dobbin, the farm horse.

LOOM — from the Saxon LOMA meaning "Tool or Instrument."

WEFT WINDING

76 In preparing weft, yarn is wound on to a special spool which is designed to fit inside the shuttle of a loom.

77 The operation is performed by modern automatic winding machines. Their cycle of motion is fascinating to watch, and is self explanatory.

78 Observe the metal band around the weft spool, this is an important part of Automatic Weaving and should be remembered.

SEMETIC FAMILY AT THE TIME OF THE PATRIARCHS.

PREPARATION OF WARP

The object of warping is to make a web of (lengthwise) threads.

A warping machine is divided into three main sections, the
79 Creel, the Mill, and the Beaming mechanisms.

On the Mill, threads are assembled in number and order according
80 to the construction and pattern of the cloth.

Let us assume that the cloth to be constructed is required 60 inches wide, with 50 threads per inch and 500 yards in length.

The operative places in the Creel two hundred threads which will form a web four inches wide. He then runs this four inch web on to the "Mill" until 500 yards have been measured off, then, binding this web securely on to the Mill, he moves four inches to the side and runs on an adjacent four inch wide web for a further 500 yards. This operation is
81 repeated fifteen times (to make the complete web 60 inches wide). After this, threads are simultaneously re-wound on to a " beam " by the beaming device.

DRAWING IN

Each thread of the warp must be controlled during the weaving process, and must be raised and lowered in a sequence which will produce the form of interlacing which is required, or, as we call it, "Design".

A Heddle is a frame on which are mounted thousands of wires (in
82 some instances strings) each wire having in its centre an eyelet like that of a large needle. Heddles are made up in sets, the number in each set being dependent on the particular design into which the cloth is to be woven.

The operative takes every thread in the warp separately, and draws
83 them through the eyelets, in an order which has been calculated to produce the required weave in the easiest manner.

Selection of individual threads, and handing to the drawing operator
84 is now done mechanically.

When drawing in has been completed, all threads are pulled through
85 a comb-like accessory which is called the "Reed".

FROM WALL PAINTING, PRINCE'S TOMB, AT BENI HASAN, ON THE NILE (note fabric designs).

TWISTING IN

86

It is readily seen how colossal a task this " drawing in " really is — at times, however, a short cut is open to us, this being an operation known as " twisting in."

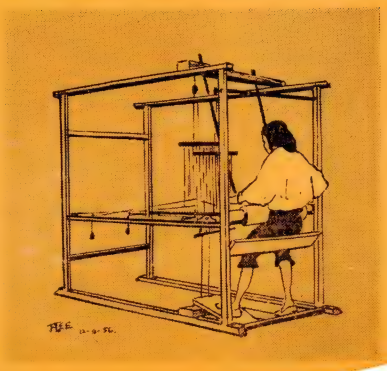
Some cloths are repeated, that is, instead of having a single warp, we have several identical warps.

In this case when the weaving of one warp has been completed, all theads are left in the eyelets of the heddles, and the new warp threads are " twisted " (loose ends rolled together in the form of a knot) to their opposite numbers. This method achieves the same object as drawing in, but is quicker.

Edmund Cartwright (1743-1823) invented the power loom. Cartwright as a Theologian and something of a poet, knew nothing of weaving but having a natural bent towards mechanical things, turned his attention to the hand loom.

Cartwright mentioned a mechanical chess playing machine which he had seen in London, " how much easier it would be to construct a mechanical Loom," he claimed. The amusement which greeted this statement prompted him to take up the challenge presented by the hand loom.

Incidently the inventor's argument was not very sound as the mechanical chessplayer had— unknown to Cartwright—a man inside it!



Weaving

The loom, which is a machine on which fabrics are woven, is a complex mechanism though simple in principle.

87 The warp beam is placed behind the loom.

88 Heddles are mounted on top.

89 The reed is fixed in a part of the loom which goes backwards and forwards.

90 Heddles are operated by a mechanism known as a " Dobby " and this raises and lowers the heddles to the sequence of the weave.

91 The Dobby is activated by a pattern chain, which we can liken to the roll of music in a player piano — save that combinations of heddles, not chords, are selected.

92 Heddles operated in this manner, lift certain warp threads from their fellows, and through the space thus created, the shuttle is propelled at high speed. In doing so it leaves a trail of weft thread behind it.

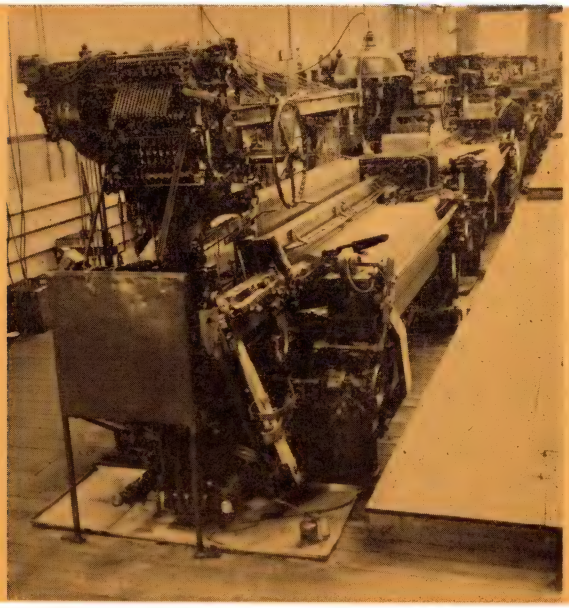
93 Examine a shuttle, note the weft spool within it, you will quickly see how its construction permits the shuttle to leave a trail of weft between the raised and lowered warp threads.

94 When this trail of weft is left, the reed moves forward and carries this trail into the woven cloth, then certain warp threads which were up are lowered, some which were down are raised (this by the next movement of heddles) thus entrapping or binding into the cloth the weft of thread which has just been carried forward, and at the same time another space is formed through which the shuttle is again propelled, and the weaving cycle repeated.

The first Hattersley power loom was made in 1834. It was siezed and smashed on the roadside by an irate mob of Luddites— handcraftsmen forced to violence by fear that the introduction of power machines would rob them of their livelihood.

When more than one weft colour is required, you will see that several shuttles are employed, each carrying a component colour of the
95 fabric. A chain ("Roll of music") driven device brings the various shuttles into operation, in order to meet the demands of the design, that is, to insert colours in their proper place.

The loom under inspection—made by Hattersleys—is modern though not their fully automatic model. It is therefore, necessary for the weaver to observe the shuttle in flight, and replenish weft spools as required. It is also the weaver's duty to watch for broken warp threads and repair them as they occur. Such duties require keen perception and a high degree of skill.



AN AUTOMATIC LOOM

FULLY AUTOMATIC WEAVING

These machines embody the same principle as those already inspected, but weft is automatically replenished whilst the loom is running at top speed. Similarly, if a thread breaks the loom immediately stops.

In the Winding Department your attention was drawn to the metal band around the weft spool. Here the secret of weft replacement lies. The metal band of course is covered when the spool is filled, but it is bared as the thread becomes unwound.

96 At one side of the loom electric " feelers " are mounted, and these probe the shuttle when it reaches the end of its flight. As the metal band is uncovered, a circuit is made, and sets in motion a mechanism which hammers in a full weft spool to displace the empty spool from the shuttle. All this is done so swiftly that the action must be carefully watched in order to detect the movement.

97 Four colour automatic looms have a " brain box," an ingenious arrangement which receives a message from the feelers when a new spool is needed. The " brain " works out the particular weft colour required, transmits the information to the magazine, which then releases to the shuttle, a spool of the appropriate weft colour. Up to a total of four different colours may be thus introduced.

A shuttle in full flight travels at approximately 35 miles per hour. The aggregate distance travelled by all shuttles in this room is 406 miles each hour.

DARNING

98 Yarn subjected to the terrific speed and strain of weaving, must occasionally break, causing a fault in the fabric.

Ladies are employed to inspect the woven fabrics for such faults, and for any faults which may have occured in other processes. Such defects are skillfully repaired.

You will find it worthwhile to watch nimble fingers repairing such damage, and deftly removing any blemish which would otherwise mar the cloth's perfection.

WET FINISHING

99 All fabrics which have been inspected and darned, must be thoroughly scoured, in order to remove anti-static oils, or any stain collected during the journey through the Mill.

The actual finish of the fabric varies according to its character, for example we expect an overcoating material to be thick and felted, whereas a worsted suiting would be clean and smooth.

100 The "felting" of cloths takes place in a Milling machine, where fabric, running through pressure rollers in rope form, is forcibly compressed. The fabric runs in a light soapy solution, to lubricate and so prevent damage by friction.

101 Hydro extracting (spin drying) follows. Here excess moisture is removed before the fabric proceeds through the actual drying machine.

Some woollen fabrics still contain vegetable matter in the form of burr and seed. These stick tenaciously to the wool because nature has provided them with the means to firmly anchor themselves.

To remove them the fabric is placed in a vessel for immersion
102 in a weak solution of sulphuric acid and water. It is then dried at a high temperature, whereupon the acid carbonizes the vegetable matter. It easily powders and drops from the fabric whilst the wool fibres remain unaffected.

Known as a "Tenter" this
103 huge drying machine quickly reduces the moisture content of material to its normal level. Fabric is fed on to a chain automatically and journeys through a drying chamber. An electronic control of moisture content, determines the speed at which it must travel.

Cottage craftsmen would wash their fabrics in nearby streams, and dry by means of suspending the material on two huge hooks — "tenter hooks" — hence the well known saying that a person in suspense is on tenter hooks. There are several Tenter Streets in London recalling the days when tenter frames were erected in the open air.

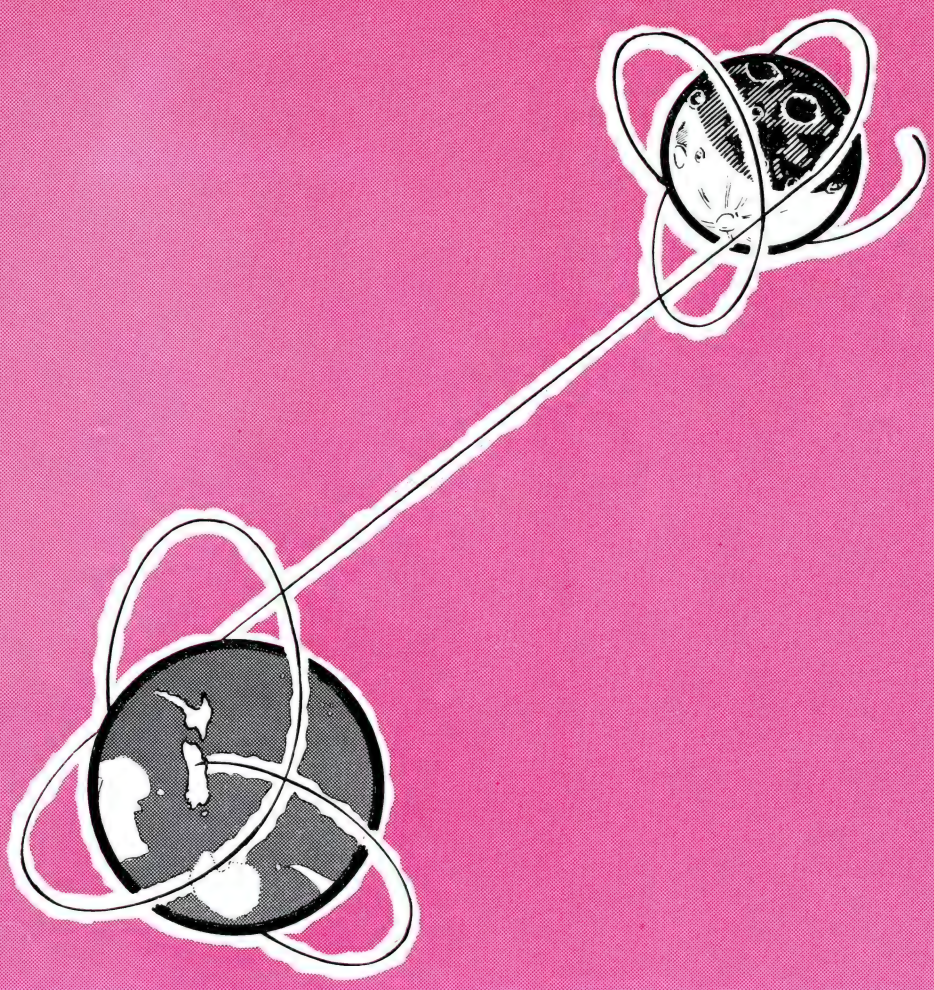
We proceed to the Blanket "Raising" department where two ma-
104 chines "teazle" or raise the surface of the milled blanket fabric, so as to give it the characteristic and cosy properties for which it is famous.

The material passes over small wire brush covered rollers, and these revolve within the rotating large cylinder which they form, thus brushing the surface of the fabric into a fluffy pile.

Thomas Blanket, who was a weaver of Bristol, pioneered the novel idea of making bed coverings snug and cosy by means of hand teazling.

The discovery was made in the year 1320, and the resultant fabric has borne his name since then.

Blankets are finished in an adjoining room, they are cut to appropriate sizes and bound with attractive satin. Afterwards an attractive woven label with the cheery Robin of "Robinwul" fame is affixed.



- *Some most interesting facts and figures are to be found in our Worsted Section, for example :*
- *There is a total length of sixteen miles in a single pound of the finest yarn spun here.*
- *A man's worsted suit contains sixteen miles of thread, too, but in this instance the weight would be in the region of three and a half pounds.*
- *If "Dualux" underwear and "Nomend" half hose were added, the total length of worsted thread worn by a well dressed man is in the vicinity of 30 miles.*
- *In one week we spin sufficient Worsted yarn to encircle the world twice, with enough left over to stretch from Ashburton to Boston via London.*
- *In one month the total length of yarn spun would reach from Earth to Moon, with thread to spare sufficient to encircle both Moon and Globe, thrice.*

The Finished Article

After scouring, or milling and drying, fabric is " woolly," that is, there are fibres protruding from the surface of the cloth and they must be removed.

To do this, material is processed on a cropping machine which has
105 three cutting heads, one operating on the back of the cloth, the other two on the surface. Blades, which are like those of a lawn mower but extremely sharp, can be set to a thousandth of an inch, and a correct setting is needed for each type of cloth. Cropped fibre is removed from the blades by suction.

Wool subjected to high steam temperatures becomes plastic and so can be moulded.

In order to set the cloth, that is, to make it firm and compact, it is subjected to high temperature steam and pressure, in a machine known as a " Blower."

The material is wrapped onto a large perforated cylinder conjointly
106 with a densely woven cotton material. It is thus held firmly flat, under pressure.

High temperature steam is introduced into the cylinder and high pressure forces it through the fabric. In this manner the wool fibre becomes pliable and settles into a firmly flat form, it is then gradually cooled by a powerful vacuum pump, and the cloth " sets " and cannot be distorted or otherwise pulled out of shape, except when subjected to a steam temperature as high as that encountered in this machine.

As the temperature of this steam is higher than anything likely to be encountered afterwards, we can consider the fabric to be firmly and truly set.

107 A slight glaze is left on the fabric as a result of the preceeding process, and this is removed by a light steaming and brushing action, after which the fabric is again inspected to ensure that its state is as perfect as many skilled and careful hands can make it.

108 It is now measured and rolled for despatch — here is the work of our hands, and we say goodbye to it with a feeling of pride knowing that its quality and construction will live up to the tradition and guarantee of our "Canterbury" trade mark, knowing too, that a customer satisfied is our aim achieved.

All products with the exception of "Robinwul" spreads and blankets, are despatched to our large Christchurch factory where they are fashioned into knitwear, sportswear, and tailored goods in an amazing variety.

Perhaps one day you will see this fascinating part of the "Canterbury" story.

Certain birds have a natural instinct for weaving and sewing. These wonderful creatures achieve results which are strikingly similar to Man's equivalent handicrafts.

The Weaver Finch constructs its sleeve-shaped nest with "fabric" which is just as truly woven as if it had been produced on a loom.

In South Africa there are birds which are called Sociable Weavers because they combine their efforts in weaving a nest which envelopes the greater part of a small tree. They add to this tenement-like dwelling from time to time, as the growth of their community demands.

A truly astonishing creature is the Asiatic Tailor Bird, which actually sews leaves together, edge to edge. With fibre for thread and using its beak as a needle, this feathered tailor employs an over and over stitch to gather the leaves into the cup-like receptacle which holds its nest.

New Zealand provides a unique item for our collection of historic odds and ends.

The famous Merino wool growing district of South Canterbury, called the "Mackenzie Country" gets its name from a convicted sheep thief!

Stealing sheep, a serious matter, added to the woes of early colonists, for periodic outbreaks kept them in a state of turmoil.

A particularly audacious theft took place in 1855, when a thousand sheep were lifted from a property near Cave. After exhaustive searching, tracks of the stolen sheep were found and followed, and these led the station manager and two Maori helpers, called Taiko and Seventeen, through a torturous mountain pass, (the existence of which had been hitherto unsuspected) on to a great plain which lay beyond.

Other and older sheep tracks were noted by the pursuers who concluded that they had at last solved the mystery which surrounded the occasional disappearance of mobs of sheep.

The stolen flock was overtaken on the plain and its unlawful shepherd apprehended. The man was overpowered and bound hand and foot, but he succeeded in slipping his bonds and made his escape that night. He had been recognised as James Mackenzie however, and was afterwards discovered and arrested in Lyttelton. Later he was brought to trial.

Found guilty, Mackenzie was convicted and put in a prison from which he was to break out several times before he was finally pardoned.

[The pardon was granted partly for health reasons, his physical state having deteriorated rapidly as a result of incarceration, and also on the grounds that he was a Gaelic-speaking Highlander by birth, and at his trial had claimed, or feigned, an ignorance of the English language, and could well have been at a disadvantage in this respect.]

The Crimean war was in progress when the trial was held. War news casualty lists were crowding other reports from the newspaper columns, consequently we are without the details we would like concerning Mackenzie.

All sorts of legends are accredited to him, and it is hard to decide which are well founded, and which are not.

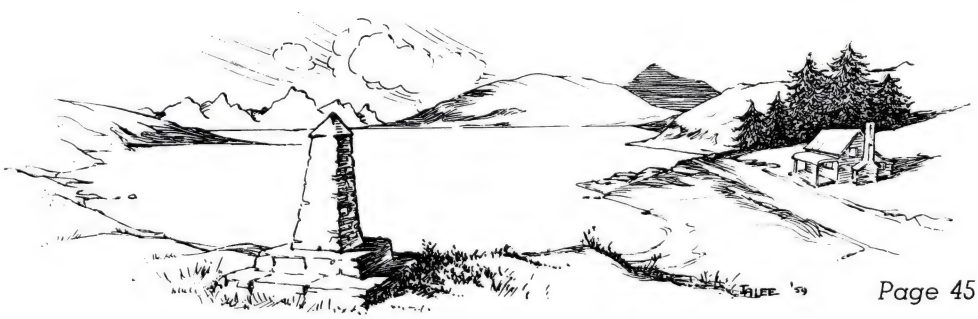
The popularly accepted account comes from the pen of the policeman who made the arrest.

It seems that Mackenzie's partner in crime was a dog, possessing amazing intelligence. This sagacious animal was said to be the actual thief. It was alleged that the dog would accompany his master on a daylight survey of a "prospect". Encampment for the night would be made some distance away. The dog would return in the hours of darkness to round up the sheep which had been surveyed, and herd them to the waiting Mackenzie, who, knowing the district well and being aware of the routes unknown to others, would strike camp and seemingly spirit the sheep away, to eventually dispose of them far from the scene of his crime.

It is believed that the dog also received a sentence from the court ordering its destruction.

Today with the majestic peaks of the Southern Alps providing a background of breathtaking beauty, a fertile plain, a mountain river, and a mountain pass bear Mackenzie's name. Amidst all this, a lonely cairn proclaims.

"In this spot James Mackenzie the freebooter was captured by John Sidebottom and the Maoris Taiko and Seventeen and escaped from them the same night, 4th March, 1855."



Wool in Words

Many words and phrases in common usage today have their origin in textile phrases of ancient times.

We have already pointed out how a person in a state of anxiety or suspense is described as being "on tenterhooks".

Other interesting survivals are worthy of mention.

A good example is the word "Spinster" which in Anglo-Saxon times meant "one who spins". Young girls were mainly engaged in this process and the term came to be applied more particularly to them.

Just as modern girls fill a "hope chest" or "glory box" the girls of long ago hoped for a happy marriage and prepared by providing a good stock of blankets and clothes. It naturally followed that a great deal of time was spent with distaff and spindle, and gradually the term spinster was more commonly applied to the unmarried female rather than to the process worker it originally described. Again, on the " distaff side" refers to maternal lineage, in other words the female line or those occupied with the domestic task of spinning.

"Dyed in the wool" is a well known expression and usually describes a person with unchanging or fixed ideas, in other words, true to principles. The saying has its origin in the practice of dyeing wool in its loose state, for this ensures uniform colour which is not subject to variation.

To be dressed in one's " best togs " sounds slangily modern, but it isn't. " Togs " is derived from " toga," the Roman garment of undyed wool which was slung loosely round the shoulders and body.

The "fag" or "fag end" derives from the term given to the rough or unusable ends of woven fabric.

The Handcraft was so much a part of every-day life, that many other technical phrases were incorporated in every-day speech, and to-day are used most descriptively.

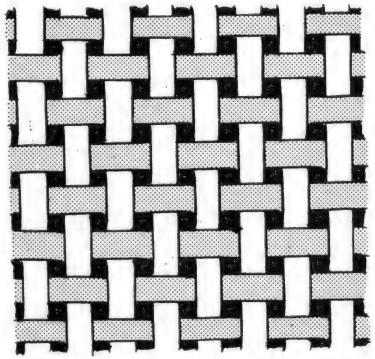
Shall we " thread our way " through the following collection?

We " spin yarns," " weave plots " also " unravel mysteries." At times we " weave in and out " or alternately " weave from side to side." It is possible to " spin around " until our senses " reel," or as a restful change we could go " wool gathering " (though we run the risk of being " teased " for doing this). Occasionally we find ourselves obliged to make things " spin out " and are compelled at times to " shuttle backwards and forwards " in some urgent activity. It is praiseworthy to give a " fair spin," nice to receive one, though, alas, sometimes judgement or outlook becomes "warped." Situations, sounds, effects and so on can be " inter-woven " with all sorts of themes or motives, and, of course, all good arguments have a " thread."

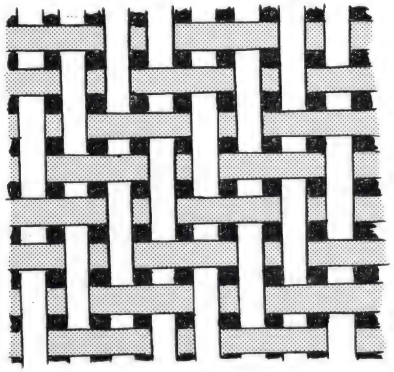
" By hook or by crook " reminds us of the shepherd and his flock, whilst " pulling wool over someone's eyes " takes us to the days when woollen wigs were worn.

" JAPANESE WEAVER "

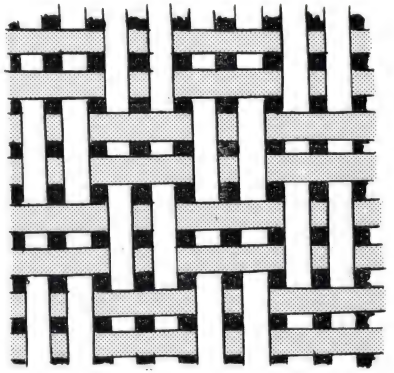
SIX COMMON WEAVES



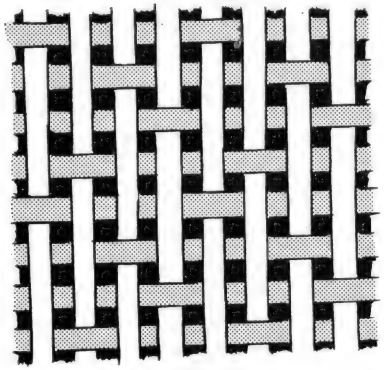
PLAIN



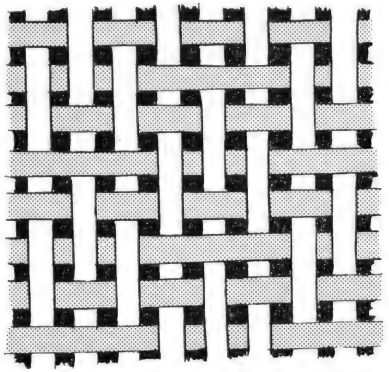
TWILL



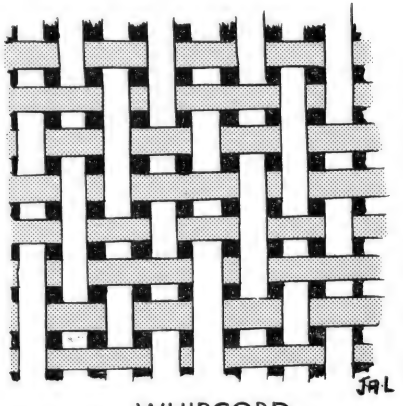
HOPSACK



SATEEN



'BELL' HOPSACK



WHIPCORD

Lost Face?

This tells you how to find it.

Did you know that all fabrics have a right side and a wrong side?

The right side is called "face", but sometimes it gets lost. That is, people occasionally find some difficulty in deciding which side should be on the outside of a garment, also the true direction of the cloth.

Here are a few simple guides which will help you solve the problem if it arises.

Woollen and Worsted fabrics when delivered to a store or warehouse, are first folded down the centre and then rolled on a board. In this form the face is always found on the **INSIDE.**

Viewed on the face, the angle of any twill weave invariably runs in a bottom-left to top-right direction.

With the exception of "furry" or pile-faced fabrics, cloths are more neatly cropped on the face than they are on the back. Gently rub each surface in turn, and view from eye level to decide this point.

If you wish to find the "up and down" direction of a cloth, untwist two threads (one each from the sets which interlace). Should one prove to be a two-ply thread whilst the other is single-ply, in nine cases out of ten the two-ply belongs to that set which comprises the warp (don't forget warp runs down a cloth and weft runs across).

In the event of both sets of yarns being two-ply, fray the edges of the fabric along each side, until a small fringe appears. Consider the density of these two fringes. Warp is usually more densely set than weft.

If you are examining a chequered cloth, depth of check is always greater than width.

Still puzzled? Well, remember that a good cloth Designer and a careful cloth Finisher, both concentrate on "face" appearance. Examine each side carefully — which looks the better?

Found it?

Good!

Over the centuries, Britain's Woollen Industry has made a valuable contribution to the country's economic well-being. Since very early times much wealth has accrued from this Trade.

Its prosperity has been carefully considered by the Legislature, partly because the Crown frequently reckoned on it as a lucrative source of revenue.

Innumerable laws have been passed to protect the Industry and to foster its growth, moreover, the expediency of filling a Monarch's coffers was not lost sight of.

The Statute Book contains many odd laws, and a few of these are worthy of mention.

- A very early law suggests a medieval form of price control. Enacted by King Ina (A.D. 712-717) it ordained " the value of a ewe with her lamb shall be one shilling until fourteen nights after Easter."

- It is recorded that merchants of London, in the year 1198, paid the Chamberlain of Richard the First, £13/11/- as fines for leave to export wool.

- Protective measures were taken in 1261 when an Act was passed prohibiting the export of wool and forbidding the importing of woollen goods.

- The measure must have been of brief duration, because we find another law, recorded 1275, which provides a duty of six shillings and eight pence (payable to the Crown) on each pack of wool exported. Edward the First got his expenses for the invasion of Wales from the monies thereby realised.

- By the year 1340, exports had grown as also had the temptation to exploit such a fruitful source of revenue, for in this year, Edward the Third increased the duty to forty shillings per pack.

● Many will be astonished to learn that England was once a prominent wool growing country. In 1350 alone, eleven and a quarter million pounds of wool were exported. (The average price was fourpence per pound!)

● Not only money, but Royal apparel was forthcoming under the laws enacted. In 1352 it was ordered that " all cloths of less measure by a yard than the Assize appointed by the statute, shall be forfeited and arrested to the King and delivered to his wardrobe."

● An example of steps taken to safeguard good standards of quality found in an edict of 1531. Under this, a fine of sixpence per fleece (payable half to the King and half to the informer) was imposed on persons found using wool which had been improperly scoured.

● A law passed in 1563 enforced on " every person not being possessed of twenty marks rental to wear a woollen knit cap on Sundays and Holidays."

● King Charles the Second, in the year 1666, introduced a truly unique measure of assistance to the Industry. His law provided that the dead should be buried in woollen shrouds.

● Without doubt, this decree had an effect and may have had something to do with another law of 1674, under which it was declared a felony to export wool.

● A contraband trade developed and under laws passed during 1672 and 1673, transport of wool, sheepskins and fullers earth was forbidden except in the hours of daylight. Subsequently, legislation was directed against any malefactor who was foolhardy enough to oppose the Law Officer's right to search for illegally carried goods. The penalty was severe — seven years transportation!

● During 1787, Pitt imposed a prohibitive tariff of thirty seven shillings and five pence per yard on woollen cloth imported into England.

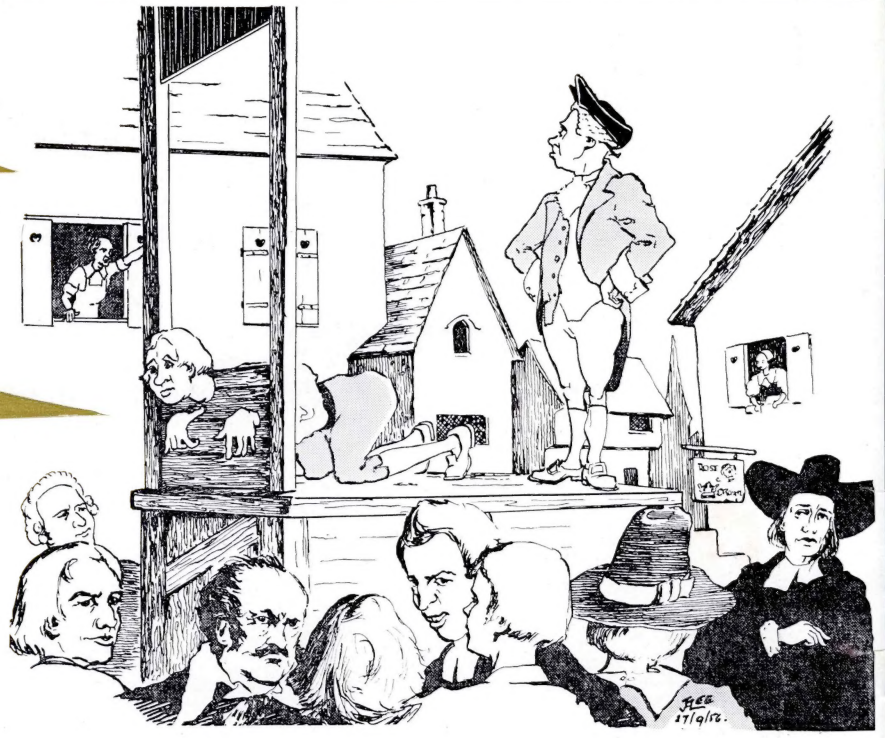
● The Industrial Revolution necessitated laws of a different nature. 1802 saw one of the first Factory Acts passed. It protected the health and morals of Parish apprentices employed in Woollen Mills.

● In 1874, the hours of work for females and children in Textile Factories was reduced to $56\frac{1}{2}$ hours per week.

● Not only Parliament, but local Authorities also had their say. Were we to open a dusty tome in the archives of a provincial textile town, we would find something like this . . . . (described by John Taylor, the Water Poet) . . . .

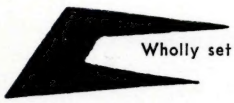
Halifax Law

1639



"This town Halifax in the County of York hath (for time out of mind) liv'd and subsisted by the rich and laudable trade of clothing, and often times their clothes were stolen from tenterhooks . . . whereupon the king (then reigning) upon their humble suit had privilege granted to the town forever. That if a thief were taken either of these three ways, which is HAND-NAPPING, BACK BEARING or TONGUE LETTING, that is either ABOUT TO STEAL, CARRYING IT AWAY OR CONFESSING that the party offending (after trial by a jury of townsmen) if the goods, be it cloth or whatsoever is valuable, is judged to have their heads struck off with an engine called a Maiden, without any assize or sessions."

Now the engine is two pieces of timber, an ell or yard asunder, fixed and closed at the top, with a cross piece like a gallows; in the inner sides of the two standing pieces are two gutters, and on the top (or cross-piece) is a pulley through which they do pull a small line or rope, and fastening it to another heavier piece of wood of a hundred weight (in which they do fix the sharp edge tool) then they do pull or hoist up the said weight, and the stolen goods is brought to the place of execution with the malefactor; now the one end of the rope is made fast to a pin or stake, which being cut, falls so ponderously and speedily that it severes the head from the body in a moment, but if there is no man will or must cut the line but the owner of the stolen goods, which if he do, he hath all again, but if he will not cut it, then he must lose all, and it is employed to some charitable uses, by which means the thief escapes, and this is Halifax law.



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